LEARNING OBJECTIVES

1) Explore the use of a commercial data acquisition system
2) Communicate with the DAQ device and learn about settings for sampling rate and range
3) Discuss differences in data acquired with two different systems, an oscilloscope and a DAQ device

BACKGROUND

Watch the video from Dr. Pardue on Introduction to Data Acquisition. This is Class 19 in the lecture section ME3023-001, and is reposted here for ease of access.

EQUIPMENT SETUP

See the materials provided to see how to set up the myDAQ.

ACTIVITIES

Activity 1) myDAQ from National Instruments and MATLAB

Getting Started with myDAQ

https://www.mathworks.com/matlabcentral/fileexchange/40749-getting-started-with-ni-mydaq

Follow along with the steps in the link above to get the myDAQ connected to MATLAB

Using the function generator, produce a **35 Hz sine wave with 750 mV peak-peak sine wave**. Check the sine wave using the Tetronix oscilloscope. You will need to t-junction BNC connector at the output of the function generator so that the signal can be sent simultaneously to the myDAQ and into MATLAB. You will be comparing the sine wave that is sampled from both the myDAQ and the oscillioscope, you would expect the signal from the function generator will be acquired with the same frequency and magnitude indicating on both devices.

The example in the Getting Started file will tell you how to set the sampling rate using MATLAB commands, it will also show you how to set the input range on the device.

Note the magnitude and frequency from the oscilloscope. Pictures of the screen readings would be helpful for your writeup!

Note the magnitude and time period of the sine wave in MATLAB, and compute the frequency from the period. You may need to remember how to use some additional commands in MATLAB, so be prepared to refer back to your ME3010 notes or use the really useful HELP feature in MATLAB

Compare the magnitude and frequency from each device.

Discuss the possible sources of error in the systems that might account for any discrepancies.

Activity 2)

Generate a **1000 Hz sine wave with 4.5 V peak.** Acquire the signal with BOTH devices, the oscilloscope and the myDAQ – MATLAB system. You will have to make changes to settings in the MATLAB setup.

Think carefully what your sampling rate should be and what range you will need on the input. Compare the sine wave you acquire from both devices. Discuss what you see in your images.

Optional (complete if you have time)

Activity 3) Log Analog Input Data to a File

https://www.mathworks.com/help/daq/log-analog-input-data-to-a-file-using-ni-devices.html

For the upcoming Challenge 8, you will be using data acquisition as part of the measurement system to calibrate a force gage. You can obtain that data while in lab and then analyze it later for your writeup. It will be helpful to save the data you have in MATLAB into a file, so try this activity if you have time this week to get a step ahead for next week.

Optional (complete if you have time)

Activity 3) Create an App for Live Data Acquisition

https://www.mathworks.com/help/daq/live-data-acquisition-app.html

You may have noticed that your prior use of the myDAQ and MATLAB system results in data being taken and then being available to you for plotting and analyzing. It is possible to use MATLAB to provide a continuously updating view of the data being collected, and this could be very useful. You MIGHT want to use this approach when gathering data for Challenge 8 next week. So, if you have time this week, go ahead and see if you can get this example working from MATLAB.

Hardware support package – Just in case a LAB computer does not have the package installed

https://www.mathworks.com/hardware-support/ni-mydaq.html